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WHAT IS CLAIMED:

1. A method for determining susceptibility of bacterial cells to an antibiotic comprising:

providing a test substance containing bacterial cells;

contacting the test substance with a growth medium containing an antibiotic, known to inhibit an operative enzyme of a bacterial biochemical pathway, to form a test substrate;

incubating the test substrate;

adding to the test substrate a histochemical reagent capable of generating a chromogenic compound as the result of interaction with the biochemical pathway, if the operative enzyme is not inhibited by the antibiotic; and,

observing the bacterial cells in the test substrate for the presence of the chromogenic compound.

- 2. The method of claim 1, further comprising:
- contacting an aliquot of the test substance containing the bacterial cells with growth medium not containing the antibiotic to form a control substrate;

incubating the control substrate;

adding the histochemical reagent to the control substrate; and,

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observing the bacterial cells in the control substrate for the presence of the chromogenic compound.

- 3. The method of claim 1, wherein the bacterial cells are selected from the group consisting of *Pseudomonas, Eschericia, Streptococcus, Staphlococcus, Enterococcus, Enterobacteriaceae, Mycobacteria, Klebsiella* and *Haemophilis*.
- 4. The method of claim 1, wherein the operative enzyme is selected from the group consisting of transpeptidase, carboxypeptidase, tetrahydropteroic acid synthetase and dihydrofolate reductase.
- 5. The method of claim 1, wherein the antibiotic is selected from the group consisting of a β -lactam, a tetracycline, an aminoglycoside, a sulfonamide, a macrolide, a fluoroquinolone and trimethoprim antibiotic.
- 6. The method of claim 1, wherein the antibiotic is selected from the group consisting of ampicillin, cefazolin, cephalothin, ceftazidime, gentamycin, mezlocillin, oxacillin, penicillin, piperacillin, ticarcillin and trimethoprim.
- 7. The method of claim 1, wherein the test substrate, and control substrate if used, are incubated from about 1 to about 120 minutes.
- 8. The method of claim 7, wherein the test substrate, and the control substrate if used, are incubated from about 30 to about 90 minutes.
- 9. The method of claim 7, wherein the test substrate, and the control substrate if used, are incubated from about 10 to about 40 minutes.

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- 10. The method of claim 1 wherein the test substance comprises a body fluid.
- 11. The method of claim 10, wherein the body fluid is selected from the group consisting of serum, plasma, spinal fluid, phlegm, saliva, nasal discharge, ocular discharge and pus.
- 12. The method of claim 1, wherein the test substance is selected from group consisting of tissue and feces.
- 13. The method of claim 1, wherein the chromogenic compound is observable by the naked eye.
- 14. The method of claim 1, wherein the chromogenic compound is observed using instrumental means.
- 15. The method of claim 14, wherein the instrumental means comprises a light microscope, a UV spectrophotometer or a laser scanner.
- 16. The method of claim 1, wherein: the antibiotic is trimethoprim; the enzyme-catalyzed biochemical pathway is a folic acid synthesis pathway; the test substrate is washed with pH6 phosphate buffer prior to contact with the histochemical reagent; and,
- the histochemical reagent comprises tetra nitro blue tetrazolium (TNBT), magnesium chloride, sodium azide, nicotinamide diphosphate (NADP) and dihydrofolic acid.
- 17. A kit for determining susceptibility of bacterial cells to one or more antibiotic(s) comprising one or more histochemical reagent(s), each of which is

capable of generating a chromogenic compound by interacting with a bacterial biochemical pathway if an operative enzyme of that pathway is not inhibited by an antibiotic.

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18. The kit of claim 17, further comprising one or more antibiotic(s) that is(are) known to inhibit the activity of an operative enzyme of a bacterial biochemical pathway that one or more of the histochemical reagent(s) is capable of interacting with to form a chromogenic compound if the operative enzyme is not inhibited by the antibiotic.

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- 19. The kit of claim 17, further comprising a growth medium.
- 20. The kit of claim 17, further comprising a fixing agent.

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21. A method for determining the susceptibility of bacterial cells to a plurality of antibiotics, comprising:

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providing a test substance containing bacterial cells;

providing a test plate having a plurality of wells, each well comprising a growth medium and a different antibiotic, wherein each antibiotic is known to inhibit an operative enzyme of a bacterial biochemical pathway;

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placing an aliquot of the test substance containing the cells into each well;

incubating the test plate;

adding to each well a histochemical reagent, which is capable of generating a chromogenic compound as the result of interacting with a biochemical pathway, if

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an operative enzyme of that pathway is not inhibited by the antibiotic in that well; and,

observing the bacterial cells in each well for the presence of the chromogenic compound.

22. A method for determining the susceptibility of bacterial cells to an antibiotic, comprising:

providing a test substance containing bacterial cells;

providing a test plate having a plurality of wells, each well comprising a growth medium and a different concentration of an antibiotic, which is known to inhibit an operative enzyme of a bacterial biochemical pathway;

placing an aliquot of the test substance containing the cells into each well; incubating the test plate;

adding to each well a histochemical reagent, which is capable of generating a chromogenic compound as the result of interaction with the biochemical pathway, if the operative enzyme is not inhibited by the concentration of antibiotic in that well; and,

observing the bacterial cells in each well for the presence of the chromogenic compound.